SEQUENCE LISTING

<110> Nicolaides, Nicholas C
       Sass, Philip M
       Grasso, Luigi M
       Kline, J Bradford

<120> METHODS FOR GENERATING ANTIBIOTIC RESISTANT MICROBES AND NOVEL
       ANTIBIOTICS

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Leu Asp Ala Gly Ala Thr Ser Val Asp Val Lys Leu Glu Asn Tyr Gly
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Phe Asp Lys Ile Glu Val Arg Asp Asn Gly Glu Gly Ile Lys Ala Val
    50                  55                  60

Asp Ala Pro Val Met Ala Met Lys Tyr Tyr Thr Ser Lys Ile Asn Ser
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His Glu Asp Leu Glu Asn Leu Thr Thr Tyr Gly Phe Arg Gly Glu Ala
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Leu Gly Ser Ile Cys Cys Ile Ala Glu Val Leu Ile Thr Thr Arg Thr
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Ala Ala Asp Asn Phe Ser Thr Gln Tyr Val Leu Asp Gly Ser Gly His
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Ile Leu Ser Gln Lys Pro Ser His Leu Gly Gln Gly Thr Thr Val Thr
    130                 135                 140

Ala Leu Arg Leu Phe Lys Asn Leu Pro Val Arg Lys Gln Phe Tyr Ser
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Thr Ala Lys Lys Cys Lys Asp Glu Ile Lys Lys Ile Gln Asp Leu Leu
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Met Ser Phe Gly Ile Leu Lys Pro Asp Leu Arg Ile Val Phe Val His
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Pro Lys Cys Asp Ala Asp His Ser Phe Thr Ser Leu Ser Thr Pro Glu
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Arg Ser Phe Ile Phe Ile Asn Ser Arg Pro Val His Gln Lys Asp Ile
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Leu Lys Leu Ile Arg His His Tyr Asn Leu Lys Cys Leu Lys Glu Ser
        275             280             285

Thr Arg Leu Tyr Pro Val Phe Phe Leu Lys Ile Asp Val Pro Thr Ala
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Asp Val Asp Val Asn Leu Thr Pro Asp Lys Ser Gln Val Leu Leu Gln
305             310             315             320

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Tyr Gly Pro Leu Pro Ser Thr Asn Ser Tyr Glu Asn Asn Lys Thr Asp
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Val Ser Ala Ala Asp Ile Val Leu Ser Lys Thr Ala Glu Thr Asp Val
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Lys Asn Thr Asp Asp Cys Leu Asn His Gln Ile Ser Ile Gly Asp Phe
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Gly Tyr Gly His Cys Ser Ser Glu Ile Ser Asn Ile Asp Lys Asn Thr
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Lys Asn Ala Phe Gln Asp Ile Ser Met Ser Asn Val Ser Trp Glu Asn
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Ser Gln Thr Glu Tyr Ser Lys Thr Cys Phe Ile Ser Ser Val Lys His
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Ser Asn Asn Asn Tyr Pro Ile Pro Glu Gln Met Asn Leu Asn Glu Asp
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Ser Cys Asn Lys Lys Ser Asn Val Ile Asp Asn Lys Ser Gly Lys Val
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Thr Ala Tyr Asp Leu Leu Ser Asn Arg Val Ile Lys Lys Pro Met Ser
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Ala Ser Ala Leu Phe Val Gln Asp His Arg Pro Gln Phe Leu Ile Glu
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Asn Pro Lys Thr Ser Leu Glu Asp Ala Thr Leu Gln Ile Glu Glu Leu
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Leu Asp Ala Gly Ala Thr Ser Val Asp Val Lys Leu Glu Asn Tyr Gly
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Phe Asp Lys Ile Glu Val Arg Asp Asn Gly Glu Gly Ile Lys Ala Val
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Asp Ala Pro Val Met Ala Met Lys Tyr Tyr Thr Ser Lys Ile Asn Ser
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His Glu Asp Leu Glu Asn Leu Thr Thr Tyr Gly Phe Arg Gly Glu Ala
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Ile Leu Ser Gln Lys Pro Ser His Leu Gly Gln Gly Thr Thr Val Thr
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Ala Leu Arg Leu Phe Lys Asn Leu Pro Val Arg Lys Gln Phe Tyr Ser
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Thr Ala Lys Lys Cys Lys Asp Glu Ile Lys Lys Ile Gln Asp Leu Leu
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Met Ser Phe Gly Ile Leu Lys Pro Asp Leu Arg Ile Val Phe Val His
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Asn Lys Ala Val Ile Trp Gln Lys Ser Arg Val Ser Asp His Lys Met
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Pro Lys Cys Asp Ala Asp His Ser Phe Thr Ser Leu Ser Thr Pro Glu
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Arg Ser Phe Ile Phe Ile Asn Ser Arg Pro Val His Gln Lys Asp Ile
        260   265   270

Leu Lys Leu Ile Arg His His Tyr Asn Leu Lys Cys Leu Lys Glu Ser
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Thr Arg Leu Tyr Pro Val Phe Phe Leu Lys Ile Asp Val Pro Thr Ala
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Asp Val Asp Val Asn Leu Thr Pro Asp Lys Ser Gln Val Leu Leu Gln
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Arg Tyr Ser Gly Ser Thr Tyr Leu Ser Asp Pro Arg Leu Thr Ala Asn
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Gly Phe Lys Ile Lys Leu Ile Pro Gly Val Ser Ile Thr Glu Asn Tyr
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Leu Glu Ile Glu Gly Met Ala Asn Cys Leu Pro Phe Tyr Gly Val Ala
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Asp Leu Lys Glu Ile Leu Asn Ala Ile Leu Asn Arg Asn Ala Lys Glu
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Val Tyr Glu Cys Arg Pro Arg Lys Val Ile Ser Tyr Leu Glu Gly Glu
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Ala Val Arg Leu Ser Arg Gln Leu Pro Met Tyr Leu Ser Lys Glu Asp
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Asp Ala Leu Leu Ala Ala Arg Glu Val Phe Lys Thr Gln Gly Val Ile
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Lys Tyr Met Gly Pro Ala Gly Ala Lys Asn Leu Gln Ser Val Val Leu
65   70   75   80

Ser Lys Met Asn Phe Glu Ser Phe Val Lys Asp Leu Leu Leu Val Arg
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Gln Tyr Arg Val Glu Val Tyr Lys Asn Arg Ala Gly Asn Lys Ala Ser
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Ser Gln Phe Glu Asp Ile Leu Phe Gly Asn Asn Asp Met Ser Ala Ser
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Ile Gly Val Val Gly Val Lys Met Ser Ala Val Asp Gly Gln Arg Gln
145   150   155   160

Val Gly Val Gly Tyr Val Asp Ser Ile Gln Arg Lys Leu Gly Leu Cys
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Glu Phe Pro Asp Asn Asp Gln Phe Ser Asn Leu Glu Ala Leu Leu Ile
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Gln Ile Gly Pro Lys Glu Cys Val Leu Pro Gly Gly Glu Thr Ala Gly

Page 24

Asp Met Gly Lys Leu Arg Gln Ile Ile Gln Arg Gly Gly Ile Leu Ile
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Thr Glu Arg Lys Lys Ala Asp Phe Ser Thr Lys Asp Ile Tyr Gln Asp
225   230   235   240

Leu Asn Arg Leu Leu Lys Gly Lys Lys Gly Glu Gln Met Asn Ser Ala
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Val Leu Pro Glu Met Glu Asn Gln Val Ala Val Ser Ser Leu Ser Ala
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Val Ile Lys Phe Leu Glu Leu Leu Ser Asp Asp Ser Asn Phe Gly Gln
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Phe Glu Leu Thr Thr Phe Asp Phe Ser Gln Tyr Met Lys Leu Asp Ile
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Gln Thr Leu Asn Asp Val Leu Ala Gln Leu Asp Ala Val Val Ser Phe
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Tyr Ile Ala Thr Lys Ile Gly Ala Phe Cys Met Phe Ala Thr His Phe
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Val Lys Lys Gly Val Cys Asp Gln Ser Phe Gly Ile His Val Ala Glu
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Val Ile Val Lys Glu Gly Gly Leu Lys Leu Ile Gln Ile Gln Asp Asn
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Gly Thr Gly Ile Arg Lys Glu Asp Leu Asp Ile Val Cys Glu Arg Phe
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Thr Thr Ser Lys Leu Gln Ser Phe Glu Asp Leu Ala Ser Ile Ser Thr
                85   90   95

Tyr Gly Phe Arg Gly Glu Ala Leu Ala Ser Ile Ser His Val Ala His
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Val Thr Ile Thr Thr Lys Thr Ala Asp Gly Lys Cys Ala Tyr Arg Ala
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Ser Tyr Ser Asp Gly Lys Leu Lys Ala Pro Pro Lys Pro Cys Ala Gly
    130   135   140

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Ser Val Lys Lys Gln Gly Glu Thr Val Ala Asp Val Arg Thr Leu Pro
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Asn Ala Ser Thr Val Asp Asn Ile Arg Ser Ile Phe Gly Asn Ala Val
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225             230             235             240

Lys Met Asn Gly Tyr Ile Ser Asn Ala Asn Tyr Ser Val Lys Lys Cys
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Ile Phe Leu Leu Phe Ile Asn His Arg Leu Val Glu Ser Thr Ser Leu
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Arg Lys Ala Ile Glu Thr Val Tyr Ala Ala Tyr Leu Pro Lys Asn Thr
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His Pro Phe Leu Tyr Leu Ser Leu Glu Ile Ser Pro Gln Asn Val Asp
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Val Asn Val His Pro Thr Lys His Glu Val His Phe Leu His Glu Glu
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Ser Ser Thr Ser Gly Ser Ser Asp Lys Val Tyr Ala His Gln Met Val
            370             375             380

Arg Thr Asp Ser Arg Glu Gln Lys Leu Asp Ala Phe Leu Gln Pro Leu
385             390             395             400

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Ser Lys Pro Leu Ser Ser Gln Pro Gln Ala Ile Val Thr Glu Asp Lys
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Gly Asp Thr Thr Lys Gly Thr Ser Glu Met Ser Glu Lys Arg Gly Pro
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Pro Glu Ser Gly Trp Thr Glu Glu Asp Gly Pro Lys Glu Gly Leu Ala
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Glu Tyr Ile Val Glu Phe Leu Lys Lys Lys Ala Glu Met Leu Ala Asp
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Tyr Phe Ser Leu Glu Ile Asp Glu Glu Gly Asn Leu Ile Gly Leu Pro
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Leu Leu Ile Asp Asn Tyr Val Pro Pro Leu Glu Gly Leu Pro Ile Phe
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Gln Tyr Ile Ser Glu Glu Ser Thr Leu Ser Gly Gln Gln Ser Glu Val
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Pro Gly Ser Ile Pro Asn Ser Trp Lys Trp Thr Val Glu His Ile Val
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Tyr Lys Ala Leu Arg Ser His Ile Leu Pro Pro Lys His Phe Thr Glu
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Phe Asp Lys Ile Glu Val Arg Asp Asn Gly Glu Gly Ile Lys Ala Val
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Asp Ala Pro Val Met Ala Met Lys Tyr Tyr Thr Ser Lys Ile Asn Ser
65   70   75   80

His Glu Asp Leu Glu Asn Leu Thr Thr Tyr Gly Phe Arg Gly Glu Ala
            85   90   95

Leu Gly Ser Ile Cys Cys Ile Ala Glu Val Leu Ile Thr Thr Arg Thr
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Ala Ala Asp Asn Phe Ser Thr Gln Tyr Val Leu Asp Gly Ser Gly His
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gttactggac caaatatggg gggcaagtct acgcttatga gacaggctgg cttattagct   3540

gtaatggccc agatgggttg ttacgtccct gctgaagtgt gcaggctcac accaattgat   3600

agagtgttta ctagacttgg tgcctcagac agaataatgt caggtgaaag tacatttttt   3660

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ttagtagaag attattctca aaatgttgct gtgcgcctag acatatggc atgcatggta   3900

gaaaatgaat gtgaagaccc cagccaggag actattacgt tcctctataa attcattaag   3960

ggagcttgtc ctaaaagcta tggctttaat gcagcaaggc ttgctaatct cccagaggaa   4020

gttattcaaa agggacatag aaaagcaaga gaatttgaga agatgaatca gtcactacga   4080

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atga                                                               4264
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<212> PRT
<213> Homo sapiens

<400> 16

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Met Ser Arg Gln Ser Thr Leu Tyr Ser Phe Phe Pro Lys Ser Pro Ala
1               5                   10                  15
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Leu Ser Asp Ala Asn Lys Ala Ser Ala Arg Ala Ser Arg Glu Gly Gly
        20              25              30

Arg Ala Ala Ala Ala Pro Gly Ala Ser Pro Ser Pro Gly Gly Asp Ala
        35              40              45

Ala Trp Ser Glu Ala Gly Pro Gly Pro Arg Pro Leu Ala Arg Ser Ala
        50              55              60

Ser Pro Pro Lys Ala Lys Asn Leu Asn Gly Gly Leu Arg Arg Ser Val
65              70              75              80

Ala Pro Ala Ala Pro Thr Ser Cys Asp Phe Ser Pro Gly Asp Leu Val
        85              90              95

Trp Ala Lys Met Glu Gly Tyr Pro Trp Trp Pro Cys Leu Val Tyr Asn
        100             105             110

His Pro Phe Asp Gly Thr Phe Ile Arg Glu Lys Gly Lys Ser Val Arg
        115             120             125

Val His Val Gln Phe Phe Asp Asp Ser Pro Thr Arg Gly Trp Val Ser
        130             135             140

Lys Arg Leu Leu Lys Pro Tyr Thr Gly Ser Lys Ser Lys Glu Ala Gln
145             150             155             160

Lys Gly Gly His Phe Tyr Ser Ala Lys Pro Glu Ile Leu Arg Ala Met
            165             170             175

Gln Arg Ala Asp Glu Ala Leu Asn Lys Asp Lys Ile Lys Arg Leu Glu
        180             185             190

Leu Ala Val Cys Asp Glu Pro Ser Glu Pro Glu Glu Glu Glu Glu Met
        195             200             205

Glu Val Gly Thr Thr Tyr Val Thr Asp Lys Ser Glu Glu Asp Asn Glu
        210             215             220

Ile Glu Ser Glu Glu Glu Val Gln Pro Lys Thr Gln Gly Ser Arg Arg
225             230             235             240

Ser Ser Arg Gln Ile Lys Lys Arg Arg Val Ile Ser Asp Ser Glu Ser
            245             250             255

Asp Ile Gly Gly Ser Asp Val Glu Phe Lys Pro Asp Thr Lys Glu Glu
        260             265             270
```

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Gly Ser Ser Asp Glu Ile Ser Ser Gly Val Gly Asp Ser Glu Ser Glu
    275   280   285

Gly Leu Asn Ser Pro Val Lys Val Ala Arg Lys Arg Lys Arg Met Val
    290   295   300

Thr Gly Asn Gly Ser Leu Lys Arg Lys Ser Ser Arg Lys Glu Thr Pro
305   310   315   320

Ser Ala Thr Lys Gln Ala Thr Ser Ile Ser Ser Glu Thr Lys Asn Thr
                325   330   335

Leu Arg Ala Phe Ser Ala Pro Gln Asn Ser Glu Ser Gln Ala His Val
                340   345   350

Ser Gly Gly Gly Asp Asp Ser Ser Arg Pro Thr Val Trp Tyr His Glu
                355   360   365

Thr Leu Glu Trp Leu Lys Glu Glu Lys Arg Arg Asp Glu His Arg Arg
    370   375   380

Arg Pro Asp His Pro Asp Phe Asp Ala Ser Thr Leu Tyr Val Pro Glu
385   390   395   400

Asp Phe Leu Asn Ser Cys Thr Pro Gly Met Arg Lys Trp Trp Gln Ile
                405   410   415

Lys Ser Gln Asn Phe Asp Leu Val Ile Cys Tyr Lys Val Gly Lys Phe
                420   425   430

Tyr Glu Leu Tyr His Met Asp Ala Leu Ile Gly Val Ser Glu Leu Gly
    435   440   445

Leu Val Phe Met Lys Gly Asn Trp Ala His Ser Gly Phe Pro Glu Ile
    450   455   460

Ala Phe Gly Arg Tyr Ser Asp Ser Leu Val Gln Lys Gly Tyr Lys Val
465   470   475   480

Ala Arg Val Glu Gln Thr Glu Thr Pro Glu Met Met Glu Ala Arg Cys
                485   490   495

Arg Lys Met Ala His Ile Ser Lys Tyr Asp Arg Val Val Arg Arg Glu
                500   505   510

Ile Cys Arg Ile Ile Thr Lys Gly Thr Gln Thr Tyr Ser Val Leu Glu
                515   520   525

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Gly Asp Pro Ser Glu Asn Tyr Ser Lys Tyr Leu Leu Ser Leu Lys Glu
    530              535              540

Lys Glu Glu Asp Ser Ser Gly His Thr Arg Ala Tyr Gly Val Cys Phe
545              550              555              560

Val Asp Thr Ser Leu Gly Lys Phe Phe Ile Gly Gln Phe Ser Asp Asp
             565              570              575

Arg His Cys Ser Arg Phe Arg Thr Leu Val Ala His Tyr Pro Pro Val
             580              585              590

Gln Val Leu Phe Glu Lys Gly Asn Leu Ser Lys Glu Thr Lys Thr Ile
    595              600              605

Leu Lys Ser Ser Leu Ser Cys Ser Leu Gln Glu Gly Leu Ile Pro Gly
    610              615              620

Ser Gln Phe Trp Asp Ala Ser Lys Thr Leu Arg Thr Leu Leu Glu Glu
625              630              635              640

Glu Tyr Phe Arg Glu Lys Leu Ser Asp Gly Ile Gly Val Met Leu Pro
             645              650              655

Gln Val Leu Lys Gly Met Thr Ser Glu Ser Asp Ser Ile Gly Leu Thr
             660              665              670

Pro Gly Glu Lys Ser Glu Leu Ala Leu Ser Ala Leu Gly Gly Cys Val
    675              680              685

Phe Tyr Leu Lys Lys Cys Leu Ile Asp Gln Glu Leu Leu Ser Met Ala
    690              695              700

Asn Phe Glu Glu Tyr Ile Pro Leu Asp Ser Asp Thr Val Ser Thr Thr
705              710              715              720

Arg Ser Gly Ala Ile Phe Thr Lys Ala Tyr Gln Arg Met Val Leu Asp
             725              730              735

Ala Val Thr Leu Asn Asn Leu Glu Ile Phe Leu Asn Gly Thr Asn Gly
             740              745              750

Ser Thr Glu Gly Thr Leu Leu Glu Arg Val Asp Thr Cys His Thr Pro
    755              760              765

Phe Gly Lys Arg Leu Leu Lys Gln Trp Leu Cys Ala Pro Leu Cys Asn
    770              775              780
```

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His Tyr Ala Ile Asn Asp Arg Leu Asp Ala Ile Glu Asp Leu Met Val
785   790   795   800

Val Pro Asp Lys Ile Ser Glu Val Val Glu Leu Leu Lys Lys Leu Pro
              805   810   815

Asp Leu Glu Arg Leu Leu Ser Lys Ile His Asn Val Gly Ser Pro Leu
          820   825   830

Lys Ser Gln Asn His Pro Asp Ser Arg Ala Ile Met Tyr Glu Glu Thr
          835   840   845

Thr Tyr Ser Lys Lys Lys Ile Ile Asp Phe Leu Ser Ala Leu Glu Gly
      850   855   860

Phe Lys Val Met Cys Lys Ile Ile Gly Ile Met Glu Glu Val Ala Asp
865   870   875   880

Gly Phe Lys Ser Lys Ile Leu Lys Gln Val Ile Ser Leu Gln Thr Lys
              885   890   895

Asn Pro Glu Gly Arg Phe Pro Asp Leu Thr Val Glu Leu Asn Arg Trp
          900   905   910

Asp Thr Ala Phe Asp His Glu Lys Ala Arg Lys Thr Gly Leu Ile Thr
          915   920   925

Pro Lys Ala Gly Phe Asp Ser Asp Tyr Asp Gln Ala Leu Ala Asp Ile
      930   935   940

Arg Glu Asn Glu Gln Ser Leu Leu Glu Tyr Leu Glu Lys Gln Arg Asn
945   950   955   960

Arg Ile Gly Cys Arg Thr Ile Val Tyr Trp Gly Ile Gly Arg Asn Arg
              965   970   975

Tyr Gln Leu Glu Ile Pro Glu Asn Phe Thr Thr Arg Asn Leu Pro Glu
          980   985   990

Glu Tyr Glu Leu Lys Ser Thr Lys Lys Gly Cys Lys Arg Tyr Trp Thr
          995   1000   1005

Lys Thr Ile Glu Lys Lys Leu Ala Asn Leu Ile Asn Ala Glu Glu
    1010   1015   1020

Arg Arg Asp Val Ser Leu Lys Asp Cys Met Arg Arg Leu Phe Tyr
    1025   1030   1035

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```
Asn Phe Asp Lys Asn Tyr Lys  Asp Trp Gln Ser Ala  Val Glu Cys
    1040            1045                1050

Ile Ala Val Leu Asp Val Leu  Leu Cys Leu Ala Asn  Tyr Ser Arg
    1055            1060                1065

Gly Gly Asp Gly Pro Met Cys  Arg Pro Val Ile Leu  Leu Pro Glu
    1070            1075                1080

Asp Thr Pro Pro Phe Leu Glu  Leu Lys Gly Ser Arg  His Pro Cys
    1085            1090                1095

Ile Thr Lys Thr Phe Phe Gly  Asp Asp Phe Ile Pro  Asn Asp Ile
    1100            1105                1110

Leu Ile Gly Cys Glu Glu Glu  Glu Gln Glu Asn Gly  Lys Ala Tyr
    1115            1120                1125

Cys Val Leu Val Thr Gly Pro  Asn Met Gly Gly Lys  Ser Thr Leu
    1130            1135                1140

Met Arg Gln Ala Gly Leu Leu  Ala Val Met Ala Gln  Met Gly Cys
    1145            1150                1155

Tyr Val Pro Ala Glu Val Cys  Arg Leu Thr Pro Ile  Asp Arg Val
    1160            1165                1170

Phe Thr Arg Leu Gly Ala Ser  Asp Arg Ile Met Ser  Gly Glu Ser
    1175            1180                1185

Thr Phe Phe Val Glu Leu Ser  Glu Thr Ala Ser Ile  Leu Met His
    1190            1195                1200

Ala Thr Ala His Ser Leu Val  Leu Val Asp Glu Leu  Gly Arg Gly
    1205            1210                1215

Thr Ala Thr Phe Asp Gly Thr  Ala Ile Ala Asn Ala  Val Val Lys
    1220            1225                1230

Glu Leu Ala Glu Thr Ile Lys  Cys Arg Thr Leu Phe  Ser Thr His
    1235            1240                1245

Tyr His Ser Leu Val Glu Asp  Tyr Ser Gln Asn Val  Ala Val Arg
    1250            1255                1260

Leu Gly His Met Ala Cys Met  Val Glu Asn Glu Cys  Glu Asp Pro
    1265            1270                1275
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Ser Gln  Glu Thr Ile Thr Phe  Leu Tyr Lys Phe Ile  Lys Gly Ala
    1280             1285             1290

Cys Pro  Lys Ser Tyr Gly Phe  Asn Ala Ala Arg Leu  Ala Asn Leu
    1295             1300             1305

Pro Glu  Glu Val Ile Gln Lys  Gly His Arg Lys Ala  Arg Glu Phe
    1310             1315             1320

Glu Lys  Met Asn Gln Ser Leu  Arg Leu Phe Arg Glu  Val Cys Leu
    1325             1330             1335

Ala Ser  Glu Arg Ser Thr Val  Asp Ala Glu Ala Val  His Lys Leu
    1340             1345             1350

Leu Thr  Leu Ile Lys Glu Leu
    1355             1360


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<212>  DNA
<213>  Homo sapiens

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ggctttacct ggtacatcgg catggcgcaa ccaaagcaag agagggtggc gcgtgccaga      180

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gcagtccggt gtgctctgat tggtccaggc tctttgacgt cacggactcg acctttgaca      420

gagccactag gcgaaaagga gagacgggaa gtattttttc cgccccgccc ggaaagggtg      480

gagcacaacg tcgaaagcag ccgttgggag cccaggaggc ggggcgcctg tgggagccgt      540

ggagggaact ttcccagtcc ccgaggcgga tccggtgttg catccttgga gcgagctgag      600

aactcgagta cagaacctgc taaggccatc aaacctattg atcggaagtc agtccatcag      660

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aacagtctgg atgctggtgc cactaatgtt gatctaaagc ttaaggacta tggagtggat      780

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ggctttcggg gggaagctct gagctcactt tgtgcactga gtgatgtcac catttctacc      960

tgccgtgtat cagcgaaggt tgggactcga ctggtgtttg atcactatgg gaaaatcatc     1020
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cagaaaaccc cctacccccg ccccagaggg atgacagtca gcgtgaagca gttattttct    1080

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cccttcgcct tctgccgtga ttgtcagttt cctgaggcct ccccagccat gcttcctgta    1200

cagcctgtag aactgactcc tagaagtacc ccaccccacc cctgctcctt ggaggacaac    1260

gtgatcactg tattcagctc tgtcaagaat ggtccaggtt cttctagatg atctgcacaa    1320

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<210> 18
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<212> PRT
<213> Homo sapiens

<400> 18

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Met Ala Gln Pro Lys Gln Glu Arg Val Ala Arg Ala Arg His Gln Arg
1               5                   10                  15

Ser Glu Thr Ala Arg His Gln Arg Ser Glu Thr Ala Lys Thr Pro Thr
            20                  25                  30

Leu Gly Asn Arg Gln Thr Pro Thr Leu Gly Asn Arg Gln Thr Pro Arg
            35                  40                  45

Leu Gly Ile His Ala Arg Pro Arg Arg Arg Ala Thr Thr Ser Leu Leu
    50                  55                  60

Thr Leu Leu Leu Ala Phe Gly Lys Asn Ala Val Arg Cys Ala Leu Ile
65                  70                  75                  80

Gly Pro Gly Ser Leu Thr Ser Arg Thr Arg Pro Leu Thr Glu Pro Leu
            85                  90                  95

Gly Glu Lys Glu Arg Arg Glu Val Phe Phe Pro Pro Arg Pro Glu Arg
            100                 105                 110

Val Glu His Asn Val Glu Ser Ser Arg Trp Glu Pro Arg Arg Arg Gly
            115                 120                 125

Ala Cys Gly Ser Arg Gly Gly Asn Phe Pro Ser Pro Arg Gly Gly Ser
    130                 135                 140

Gly Val Ala Ser Leu Glu Arg Ala Glu Asn Ser Ser Thr Glu Pro Ala
145                 150                 155                 160

Lys Ala Ile Lys Pro Ile Asp Arg Lys Ser Val His Gln Ile Cys Ser
```

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Gly Pro Val Val Pro Ser Leu Arg Pro Asn Ala Val Lys Glu Leu Val
            180   185   190

Glu Asn Ser Leu Asp Ala Gly Ala Thr Asn Val Asp Leu Lys Leu Lys
        195   200   205

Asp Tyr Gly Val Asp Leu Ile Glu Val Ser Gly Asn Gly Cys Gly Val
    210   215   220

Glu Glu Glu Asn Phe Glu Gly Phe Thr Leu Lys His His Thr Cys Lys
225   230   235   240

Ile Gln Glu Phe Ala Asp Leu Thr Gln Val Glu Thr Phe Gly Phe Arg
            245   250   255

Gly Glu Ala Leu Ser Ser Leu Cys Ala Leu Ser Asp Val Thr Ile Ser
            260   265   270

Thr Cys Arg Val Ser Ala Lys Val Gly Thr Arg Leu Val Phe Asp His
        275   280   285

Tyr Gly Lys Ile Ile Gln Lys Thr Pro Tyr Pro Arg Pro Arg Gly Met
    290   295   300

Thr Val Ser Val Lys Gln Leu Phe Ser Thr Leu Pro Val His His Lys
305   310   315   320

Glu Phe Gln Arg Asn Ile Lys Lys Lys Arg Ala Cys Phe Pro Phe Ala
            325   330   335

Phe Cys Arg Asp Cys Gln Phe Pro Glu Ala Ser Pro Ala Met Leu Pro
            340   345   350

Val Gln Pro Val Glu Leu Thr Pro Arg Ser Thr Pro Pro His Pro Cys
        355   360   365

Ser Leu Glu Asp Asn Val Ile Thr Val Phe Ser Ser Val Lys Asn Gly
    370   375   380

Pro Gly Ser Ser Arg
385

<210>   19
<211>   1785
<212>   DNA
<213>   Homo sapiens

<400> 19

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gggagctgca gaccagtctt ccgtggcagg ctgagcgctc cagtcttcag tagggaattg     180

ctgaataggc acagagggca cctgtacacc ttcagaccag tctgcaacct caggctgagt     240

agcagtgaac tcaggagcgg gagcagtcca ttcaccctga aattcctcct tggtcactgc     300

cttctcagca gcagcctgct cttcttttc aatctcttca ggatctctgt agaagtacag      360

atcaggcatg acctcccatg ggtgttcacg ggaaatggtg ccacgcatgc gcagaacttc     420

ccgagccagc atccaccaca ttaaacccac tgagtgagct cccttgttgt tgcatgggat     480

ggcaatgtcc acatagcgca gaggagaatc tgtgttacac agcgcaatgg taggtaggtt     540

aacataagat gcctccgtga gaggcgaagg ggcggcggga cccgggcctg gcccgtatgt     600

gtccttggcg gcctagacta ggccgtcgct gtatggtgag ccccagggag gcggatctgg     660

gcccccagaa ggacacccgc ctggatttgc cccgtagccc ggcccgggcc cctcgggagc     720

agaacagcct tggtgaggtg gacaggaggg gacctcgcga gcagacgcgc gcgccagcga     780

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ggccagtgtc attcaaagat gtggctgtgg atttcacca ggaggagtgg cggcaactgg      960

accctgatga gaagatagca tacggggatg tgatgttgga gaactacagc catctagttt    1020

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cacacatgta agattcaaga gtttgccgac ctaactgaag ttgaaacttt cggttttcag    1440

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ccctacccc acccccagagg gaccacagtc agcgtgaagc agttattttc tacgctacct    1620

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<211> 264

<212> PRT
<213> Homo sapiens

<400> 20

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1   5   10   15

Arg Glu Ala Asp Leu Gly Pro Gln Lys Asp Thr Arg Leu Asp Leu Pro
            20   25   30

Arg Ser Pro Ala Arg Ala Pro Arg Glu Gln Asn Ser Leu Gly Glu Val
        35   40   45

Asp Arg Arg Gly Pro Arg Glu Gln Thr Arg Ala Pro Ala Thr Ala Ala
    50   55   60

Pro Pro Arg Pro Leu Gly Ser Arg Gly Ala Glu Ala Ala Glu Pro Gln
65   70   75   80

Glu Gly Leu Ser Ala Thr Val Ser Ala Cys Phe Gln Glu Gln Gln Glu
                85   90   95

Met Asn Thr Leu Gln Gly Pro Val Ser Phe Lys Asp Val Ala Val Asp
            100   105   110

Phe Thr Gln Glu Glu Trp Arg Gln Leu Asp Pro Asp Glu Lys Ile Ala
            115   120   125

Tyr Gly Asp Val Met Leu Glu Asn Tyr Ser His Leu Val Ser Val Gly
    130   135   140

Tyr Asp Tyr His Gln Ala Lys His His His Gly Val Glu Val Lys Glu
145   150   155   160

Val Glu Gln Gly Glu Glu Pro Trp Ile Met Glu Gly Glu Phe Pro Cys
                165   170   175

Gln His Ser Pro Glu Pro Ala Lys Ala Ile Lys Pro Ile Asp Arg Lys
            180   185   190

Ser Val His Gln Ile Cys Ser Gly Pro Val Val Leu Ser Leu Ser Thr
            195   200   205

Ala Val Lys Glu Leu Val Glu Asn Ser Leu Asp Ala Gly Ala Thr Asn
    210   215   220

Ile Asp Leu Lys Leu Lys Asp Tyr Gly Val Asp Leu Ile Glu Val Ser
225   230   235   240

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Asp Asn Gly Cys Gly Val Glu Glu Glu Asn Phe Glu Gly Leu Ile Ser
            245                 250                 255


Phe Ser Ser Glu Thr Ser His Met
            260
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<212> DNA
<213> Homo sapiens

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gaacctgcta aggccatcaa acctattgat cggaagtcag tccatcagat ttgctctggg    600

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<210> 22
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<212> PRT
<213> Homo sapiens

<400> 22

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Met Cys Pro Trp Arg Pro Arg Leu Gly Arg Arg Cys Met Val Ser Pro
1               5                  10                  15


Arg Glu Ala Asp Leu Gly Pro Gln Lys Asp Thr Arg Leu Asp Leu Pro
            20                  25                  30


Arg Ser Pro Ala Arg Ala Pro Arg Glu Gln Asn Ser Leu Gly Glu Val
            35                  40                  45


Asp Arg Arg Gly Pro Arg Glu Gln Thr Arg Ala Pro Ala Thr Ala Ala
```

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50   55   60

        Pro Pro Arg Pro Leu Gly Ser Arg Gly Ala Glu Ala Ala Glu Pro Gln
        65   70   75   80

        Glu Gly Leu Ser Ala Thr Val Ser Ala Cys Phe Gln Glu Gln Gln Glu
                        85   90   95

        Met Asn Thr Leu Gln Gly Pro Val Ser Phe Lys Asp Val Ala Val Asp
                    100   105   110

        Phe Thr Gln Glu Glu Trp Arg Gln Leu Asp Pro Asp Glu Lys Ile Ala
                    115   120   125

        Tyr Gly Asp Val Met Leu Glu Asn Tyr Ser His Leu Val Ser Val Gly
            130   135   140

        Tyr Asp Tyr His Gln Ala Lys His His His Gly Val Glu Val Lys Glu
        145   150   155   160

        Val Glu Gln Gly Glu Glu Pro Trp Ile Met Glu Gly Glu Phe Pro Cys
                        165   170   175

        Gln His Ser Pro Glu Pro Ala Lys Ala Ile Lys Pro Ile Asp Arg Lys
                    180   185   190

        Ser Val His Gln Ile Cys Ser Gly Pro Val Val Leu Ser Leu Ser Thr
                    195   200   205

        Ala Val Lys Glu Leu Val Glu Asn Ser Leu Asp Ala Gly Ala Thr Asn
            210   215   220

        Ile Asp Leu Lys Leu Lys Asp Tyr Gly Val Asp Leu Ile Glu Val Ser
        225   230   235   240

        Asp Asn Gly Cys Gly Val Glu Glu Glu Asn Phe Glu Gly Leu Ile Ser
                        245   250   255

        Phe Ser Ser Glu Thr Ser His Met
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        <210>   23
        <211>   30
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        <213>   Artificial Sequence

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        <400>   23

                                        Page 47

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<210> 24
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<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide primer

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aaccttcgcc gatgc   75

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<220>
<223> synthetic oligonucleotide primer

<400> 25
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<210> 26
<211> 75
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<213> Artificial Sequence

<220>
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<400> 26
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<212> DNA
<213> Artificial Sequence

<220>
<223> synthetic oligonucleotide primer

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     get mismatch repair gene

<220>
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<223> corresponds to the second nucleotide of the first codon of the ta
     rget mismatch repair gene

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       get mismatch repair gene


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get mismatch repair gene

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<213> Homo sapiens

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gtggctgtca gggtgaatat ggaaaccttc caagttcaag tgatagacaa tggatttggg   180

atggggagtg atgatgtaga gaaagtggga aatcgttatt tcaccagtaa atgccactcg   240

gtacaggact tggagaatcc aaggttttat ggtttccgag gagaggcctt ggcaaatatt   300

gctgacatgg ccagtgctgt ggaaatttcg tccaagaaaa acaggacaat gaaaactttt   360

gtgaaactgt ttcagagtgg aaaagccctg aaagcttgtg aagctgatgt gactagagca   420

agcgctggga ctactgtaac agtgtataac ctattttacc agcttcctgt aaggaggaaa   480

tgcatggacc ctagactgga gtttgagaag gttaggcaga gaatagaagc tctctcactc   540

atgcaccctt ccatttcttt ctctttgaga aatgatgttt ctggttccat ggttcttcag   600

ctccctaaaa ccaaagacgt atgttcccga ttttgtcaaa tttatggatt gggaaagtcc   660

caaaagctaa gagaaataag ttttaaatat aaagagtttg agcttagtgg ctatatcagc   720

tctgaagcac attacaacaa gaatatgcag tttttgtttg tgaacaaaag actagtttta   780

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aggacaaagc tacataaact cattgacttt ttattaagga aagaaagtat tatatgcaag    840

ccaaagaatg gtcccaccag taggca ttg aattcaagtc ttcggcaccg gtctacccca    900

gaactctatg gcatatatgt aattaatgtg cagtgccaat tctgtgagta tgatgtgtgc    960

atggagccag ccaaaactct gattgaattt cagaactggg acactctctt gttttgcatt   1020

caggaaggag tgaaaatgtt tttaaagcaa gaaaaattat ttgtggaatt atcaggtgag   1080

gatattaagg aatttagtga agataatggt tttagtttat ttgatgctac tcttcagaag   1140

cgtgtgactt ccgatgagag gagcaatttc caggaagcat gtaataatat tttagattcc   1200

tatgagatgt ttaatttgca gtcaaaagct gtgaaaagaa aaactactgc agaaaacgta   1260

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tacatttatg aatcaggtgg tccaggccat agcaaaatga cagagccatc tttacaaaac   1380

aaagacagct cttgctcaga atcaaagatg ttagaacaag agacaattgt agcatcagaa   1440

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tgtggaacca gtttagaaat gtttttaagc cctttttcaga caccatgtca ctttgaggag   1560

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ggatgccagc ctctgccttt tgcaacaaca ttatggggag tacatagtgc tcagacagag   1740

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gttaaattat gttccactgg ctttataact catgtagtac aaaatgaaaa aactaaatca   1860

actgaaacag aacattcatt taaaaattat gttagacctg gtcccacacg tgcccaagaa   1920

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gccacacagg ataattcctt taataaaaat agtaaaacac attctaacag caatacaaca    2880

gagaactgtg tgatatcaga aactcctttg gtattgccct ataataattc taaagttacc    2940

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cccagtggaa tgttaatgaa tccggtagaa gatgccacag gtgaccaaaa tggaatttgt    3060

tttcagagtg aggaatctaa agcaagagct tgttctgaaa ctgaagagtc aaacacgtgt    3120

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gacctgacaa ctgtggctgt ggatgttgta cttgagaatg ggtctcagta caggtgtcaa    3300

ccttttagaa gcgaccttgt tcttcctttc cttccgagag ctcgagcaga gaggactgtg    3360

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gcctgtttga tgagcactaa gactgaagag aatggcgagg cagattccta cgagaagcaa    3660

caggcacaag gctctggtcg gaaaaaatta ctgtcttcta ctctaattcc tccgctagag    3720

ataacagtga cagaggaaca aaggagactc ttatggtgtt accacaaaaa tctggaagat    3780

ctgggccttg aatttgtatt tccagacact agtgattctc tggtccttgt gggaaaagta    3840

ccactatgtt ttgtggaaag agaagccaat gaacttcgga gaggaagatc tactgtgacc    3900

aagagtattg tggaggaatt tatccgagaa caactggagc tactccagac caccggaggc    3960

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gccattaagt ttaatgatgg cctgagctta caggaaagtt gccgccttat tgaagctctg    4080

tcctcatgcc agctgccatt ccagtgtgct cacgggagac cttctatgct gccgttagct    4140

gacatagacc acttggaaca ggaaaaacag attaaaccca acctcactaa acttcgcaaa    4200

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caatccatgc ctccctgtga gccaccatga                                    4290


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<212>   PRT
<213>   Homo sapiens

<400>   29

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1               5                   10                  15
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Leu Ala Ile Ser Ser Leu Gly Gln Cys Val Glu Glu Leu Ala Leu Asn
        20              25              30

Ser Ile Asp Ala Glu Ala Lys Cys Val Ala Val Arg Val Asn Met Glu
        35              40              45

Thr Phe Gln Val Gln Val Ile Asp Asn Gly Phe Gly Met Gly Ser Asp
    50              55              60

Asp Val Glu Lys Val Gly Asn Arg Tyr Phe Thr Ser Lys Cys His Ser
65              70              75              80

Val Gln Asp Leu Glu Asn Pro Arg Phe Tyr Gly Phe Arg Gly Glu Ala
            85              90              95

Leu Ala Asn Ile Ala Asp Met Ala Ser Ala Val Glu Ile Ser Ser Lys
            100             105             110

Lys Asn Arg Thr Met Lys Thr Phe Val Lys Leu Phe Gln Ser Gly Lys
        115             120             125

Ala Leu Lys Ala Cys Glu Ala Asp Val Thr Arg Ala Ser Ala Gly Thr
    130             135             140

Thr Val Thr Val Tyr Asn Leu Phe Tyr Gln Leu Pro Val Arg Arg Lys
145             150             155             160

Cys Met Asp Pro Arg Leu Glu Phe Glu Lys Val Arg Gln Arg Ile Glu
            165             170             175

Ala Leu Ser Leu Met His Pro Ser Ile Ser Phe Ser Leu Arg Asn Asp
            180             185             190

Val Ser Gly Ser Met Val Leu Gln Leu Pro Lys Thr Lys Asp Val Cys
        195             200             205

Ser Arg Phe Cys Gln Ile Tyr Gly Leu Gly Lys Ser Gln Lys Leu Arg
    210             215             220

Glu Ile Ser Phe Lys Tyr Lys Glu Phe Glu Leu Ser Gly Tyr Ile Ser
225             230             235             240

Ser Glu Ala His Tyr Asn Lys Asn Met Gln Phe Leu Phe Val Asn Lys
            245             250             255

Arg Leu Val Leu Arg Thr Lys Leu His Lys Leu Ile Asp Phe Leu Leu
        260             265             270
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Arg Lys Glu Ser Ile Ile Cys Lys Pro Lys Asn Gly Pro Thr Ser Arg
        275   280   285

Gln Met Asn Ser Ser Leu Arg His Arg Ser Thr Pro Glu Leu Tyr Gly
        290   295   300

Ile Tyr Val Ile Asn Val Gln Cys Gln Phe Cys Glu Tyr Asp Val Cys
305   310   315   320

Met Glu Pro Ala Lys Thr Leu Ile Glu Phe Gln Asn Trp Asp Thr Leu
                325   330   335

Leu Phe Cys Ile Gln Glu Gly Val Lys Met Phe Leu Lys Gln Glu Lys
                340   345   350

Leu Phe Val Glu Leu Ser Gly Glu Asp Ile Lys Glu Phe Ser Glu Asp
        355   360   365

Asn Gly Phe Ser Leu Phe Asp Ala Thr Leu Gln Lys Arg Val Thr Ser
        370   375   380

Asp Glu Arg Ser Asn Phe Gln Glu Ala Cys Asn Asn Ile Leu Asp Ser
385   390   395   400

Tyr Glu Met Phe Asn Leu Gln Ser Lys Ala Val Lys Arg Lys Thr Thr
                405   410   415

Ala Glu Asn Val Asn Thr Gln Ser Ser Arg Asp Ser Glu Ala Thr Arg
                420   425   430

Lys Asn Thr Asn Asp Ala Phe Leu Tyr Ile Tyr Glu Ser Gly Gly Pro
        435   440   445

Gly His Ser Lys Met Thr Glu Pro Ser Leu Gln Asn Lys Asp Ser Ser
        450   455   460

Cys Ser Glu Ser Lys Met Leu Glu Gln Glu Thr Ile Val Ala Ser Glu
465   470   475   480

Ala Gly Glu Asn Glu Lys His Lys Lys Ser Phe Leu Glu His Ser Ser
                485   490   495

Leu Glu Asn Pro Cys Gly Thr Ser Leu Glu Met Phe Leu Ser Pro Phe
                500   505   510

Gln Thr Pro Cys His Phe Glu Glu Ser Gly Gln Asp Leu Glu Ile Trp
        515   520   525

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Lys Glu Ser Thr Thr Val Asn Gly Met Ala Ala Asn Ile Leu Lys Asn
    530   535   540

Asn Arg Ile Gln Asn Gln Pro Lys Arg Phe Lys Asp Ala Thr Glu Val
545   550   555   560

Gly Cys Gln Pro Leu Pro Phe Ala Thr Thr Leu Trp Gly Val His Ser
                565   570   575

Ala Gln Thr Glu Lys Glu Lys Lys Lys Glu Ser Ser Asn Cys Gly Arg
            580   585   590

Arg Asn Val Phe Ser Tyr Gly Arg Val Lys Leu Cys Ser Thr Gly Phe
        595   600   605

Ile Thr His Val Val Gln Asn Glu Lys Thr Lys Ser Thr Glu Thr Glu
    610   615   620

His Ser Phe Lys Asn Tyr Val Arg Pro Gly Pro Thr Arg Ala Gln Glu
625   630   635   640

Thr Phe Gly Asn Arg Thr Arg His Ser Val Glu Thr Pro Asp Ile Lys
            645   650   655

Asp Leu Ala Ser Thr Leu Ser Lys Glu Ser Gly Gln Leu Pro Asn Lys
            660   665   670

Lys Asn Cys Arg Thr Asn Ile Ser Tyr Gly Leu Glu Asn Glu Pro Thr
            675   680   685

Ala Thr Tyr Thr Met Phe Ser Ala Phe Gln Glu Gly Ser Lys Lys Ser
    690   695   700

Gln Thr Asp Cys Ile Leu Ser Asp Thr Ser Pro Ser Phe Pro Trp Tyr
705   710   715   720

Arg His Val Ser Asn Asp Ser Arg Lys Thr Asp Lys Leu Ile Gly Phe
            725   730   735

Ser Lys Pro Ile Val Arg Lys Lys Leu Ser Leu Ser Ser Gln Leu Gly
            740   745   750

Ser Leu Glu Lys Phe Lys Arg Gln Tyr Gly Lys Val Glu Asn Pro Leu
            755   760   765

Asp Thr Glu Val Glu Glu Ser Asn Gly Val Thr Thr Asn Leu Ser Leu
770   775   780

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Gln Val Glu Pro Asp Ile Leu Leu Lys Asp Lys Asn Arg Leu Glu Asn
785             790             795             800

Ser Asp Val Cys Lys Ile Thr Thr Met Glu His Ser Asp Ser Asp Ser
                805             810             815

Ser Cys Gln Pro Ala Ser His Ile Leu Asp Ser Glu Lys Phe Pro Phe
            820             825             830

Ser Lys Asp Glu Asp Cys Leu Glu Gln Gln Met Leu Ser Leu Arg Glu
        835             840             845

Ser Pro Met Thr Leu Lys Glu Leu Ser Leu Phe Asn Arg Lys Pro Leu
    850             855             860

Asp Leu Glu Lys Ser Ser Glu Ser Leu Ala Ser Lys Leu Ser Arg Leu
865             870             875             880

Lys Gly Ser Glu Arg Glu Thr Gln Thr Met Gly Met Met Ser Arg Phe
            885             890             895

Asn Glu Leu Pro Asn Ser Asp Ser Ser Arg Lys Asp Ser Lys Leu Cys
        900             905             910

Ser Val Leu Thr Gln Asp Phe Cys Met Leu Phe Asn Asn Lys His Glu
    915             920             925

Lys Thr Glu Asn Gly Val Ile Pro Thr Ser Asp Ser Ala Thr Gln Asp
    930             935             940

Asn Ser Phe Asn Lys Asn Ser Lys Thr His Ser Asn Ser Asn Thr Thr
945             950             955             960

Glu Asn Cys Val Ile Ser Glu Thr Pro Leu Val Leu Pro Tyr Asn Asn
            965             970             975

Ser Lys Val Thr Gly Lys Asp Ser Asp Val Leu Ile Arg Ala Ser Glu
            980             985             990

Gln Gln Ile Gly Ser Leu Asp Ser  Pro Ser Gly Met Leu  Met Asn Pro
        995             1000            1005

Val Glu  Asp Ala Thr Gly Asp  Gln Asn Gly Ile Cys  Phe Gln Ser
    1010            1015            1020

Glu Glu  Ser Lys Ala Arg Ala  Cys Ser Glu Thr Glu  Glu Ser Asn
    1025            1030            1035
```

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```
Thr Cys  Cys Ser Asp Trp Gln  Arg His Phe Asp Val  Ala Leu Gly
    1040                 1045              1050


Arg Met  Val Tyr Val Asn Lys  Met Thr Gly Leu Ser  Thr Phe Ile
    1055                 1060              1065


Ala Pro  Thr Glu Asp Ile Gln  Ala Ala Cys Thr Lys  Asp Leu Thr
    1070                 1075              1080


Thr Val  Ala Val Asp Val Val  Leu Glu Asn Gly Ser  Gln Tyr Arg
    1085                 1090              1095


Cys Gln  Pro Phe Arg Ser Asp  Leu Val Leu Pro Phe  Leu Pro Arg
    1100                 1105              1110


Ala Arg  Ala Glu Arg Thr Val  Met Arg Gln Asp Asn  Arg Asp Thr
    1115                 1120              1125


Val Asp  Asp Thr Val Ser Ser  Glu Ser Leu Gln Ser  Leu Phe Ser
    1130                 1135              1140


Glu Trp  Asp Asn Pro Val Phe  Ala Arg Tyr Pro Glu  Val Ala Val
    1145                 1150              1155


Asp Val  Ser Ser Gly Gln Ala  Glu Ser Leu Ala Val  Lys Ile His
    1160                 1165              1170


Asn Ile  Leu Tyr Pro Tyr Arg  Phe Thr Lys Gly Met  Ile His Ser
    1175                 1180              1185


Met Gln  Val Leu Gln Gln Val  Asp Asn Lys Phe Ile  Ala Cys Leu
    1190                 1195              1200


Met Ser  Thr Lys Thr Glu Glu  Asn Gly Glu Ala Asp  Ser Tyr Glu
    1205                 1210              1215


Lys Gln  Gln Ala Gln Gly Ser  Gly Arg Lys Lys Leu  Leu Ser Ser
    1220                 1225              1230


Thr Leu  Ile Pro Pro Leu Glu  Ile Thr Val Thr Glu  Glu Gln Arg
    1235                 1240              1245


Arg Leu  Leu Trp Cys Tyr His  Lys Asn Leu Glu Asp  Leu Gly Leu
    1250                 1255              1260


Glu Phe  Val Phe Pro Asp Thr  Ser Asp Ser Leu Val  Leu Val Gly
    1265                 1270              1275
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Lys Val Pro Leu Cys Phe Val Glu Arg Glu Ala Asn Glu Leu Arg
    1280            1285            1290

Arg Gly Arg Ser Thr Val Thr Lys Ser Ile Val Glu Glu Phe Ile
    1295            1300            1305

Arg Glu Gln Leu Glu Leu Leu Gln Thr Thr Gly Gly Ile Gln Gly
    1310            1315            1320

Thr Leu Pro Leu Thr Val Gln Lys Val Leu Ala Ser Gln Ala Cys
    1325            1330            1335

His Gly Ala Ile Lys Phe Asn Asp Gly Leu Ser Leu Gln Glu Ser
    1340            1345            1350

Cys Arg Leu Ile Glu Ala Leu Ser Ser Cys Gln Leu Pro Phe Gln
    1355            1360            1365

Cys Ala His Gly Arg Pro Ser Met Leu Pro Leu Ala Asp Ile Asp
    1370            1375            1380

His Leu Glu Gln Glu Lys Gln Ile Lys Pro Asn Leu Thr Lys Leu
    1385            1390            1395

Arg Lys Met Ala Gln Ala Trp Arg Leu Phe Gly Lys Ala Glu Cys
    1400            1405            1410

Asp Thr Arg Gln Ser Leu Gln Gln Ser Met Pro Pro Cys Glu Pro
    1415            1420            1425

Pro


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gtcaaggagc ttgtcgagaa tagtctcgac gccggcgcca ccagtataga gattaacctc   180

cgagactacg gcgaagacta ttttcaggtc attgacaatg gttgtggcat tttccccaacc   240

aatttcaagg tttgtgtcca aattctccga agaactttg atgttcttgc acttaagcat   300

catacttcta aattagagga tttcacagat cttttgaatt tgactactta tggttttaga   360
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tgcccacacg gacgaccaac aatgcgtcat cttgtggact tgacaacttt actcacatta   2280
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<212> PRT
<213> Arabidopsis thaliana

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                20   25   30

Val Ile Leu Asp Leu Ser Ser Ala Val Lys Glu Leu Val Glu Asn Ser
            35   40   45

Leu Asp Ala Gly Ala Thr Ser Ile Glu Ile Asn Leu Arg Asp Tyr Gly
        50   55   60

Glu Asp Tyr Phe Gln Val Ile Asp Asn Gly Cys Gly Ile Ser Pro Thr
65   70   75   80

Asn Phe Lys Val Cys Val Gln Ile Leu Arg Arg Thr Phe Asp Val Leu
                85   90   95

Ala Leu Lys His His Thr Ser Lys Leu Glu Asp Phe Thr Asp Leu Leu
            100   105   110

Asn Leu Thr Thr Tyr Gly Phe Arg Gly Glu Ala Leu Ser Ser Leu Cys
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Ala Thr Leu Leu Thr Phe Asp His Ser Gly Leu Leu Thr Ala Glu Lys
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Lys Thr Ala Arg Gln Ile Gly Thr Thr Val Thr Val Arg Lys Leu Phe
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Ser Asn Leu Pro Val Arg Ser Lys Glu Phe Lys Arg Asn Ile Arg Lys
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Glu Tyr Gly Lys Leu Val Ser Leu Leu Asn Ala Tyr Ala Leu Ile Ala
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Lys Gly Val Arg Phe Val Cys Ser Asn Thr Thr Gly Lys Asn Pro Lys
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Ser Val Val Leu Asn Thr Gln Gly Arg Gly Ser Leu Lys Asp Asn Ile
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Ile Thr Val Phe Gly Ile Ser Thr Phe Thr Ser Leu Gln Pro Gly Thr
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Gly Arg Asn Leu Ala Asp Arg Gln Tyr Phe Phe Ile Asn Gly Arg Pro
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Val Asp Met Pro Lys Val Ser Lys Leu Val Asn Glu Leu Tyr Lys Asp
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Thr Ser Ser Arg Lys Tyr Pro Val Thr Ile Leu Asp Phe Ile Val Pro
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Gly Gly Ala Cys Asp Leu Asn Val Thr Pro Asp Lys Arg Lys Val Phe
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Phe Ser Asp Glu Thr Ser Val Ile Gly Ser Leu Arg Glu Gly Leu Asn
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Glu Ile Tyr Ser Ser Ser Asn Ala Ser Tyr Ile Val Asn Arg Phe Glu
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Glu Asn Ser Glu Gln Pro Asp Lys Ala Gly Val Ser Ser Phe Gln Lys
            355   360   365

Lys Ser Asn Leu Leu Ser Glu Gly Ile Val Leu Asp Val Ser Ser Lys
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Thr Arg Leu Gly Glu Ala Ile Glu Lys Glu Asn Pro Ser Leu Arg Glu
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Val Glu Ile Asp Asn Ser Ser Pro Met Glu Lys Phe Lys Phe Glu Ile
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Lys Ala Cys Gly Thr Lys Lys Gly Glu Gly Ser Leu Ser Val His Asp
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Val Thr His Leu Asp Lys Thr Pro Ser Lys Gly Leu Pro Gln Leu Asn
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Val Thr Glu Lys Val Thr Asp Ala Ser Lys Asp Leu Ser Ser Arg Ser
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Ser Phe Ala Gln Ser Thr Leu Asn Thr Phe Val Thr Met Gly Lys Arg
465   470   475   480

Lys His Glu Asn Ile Ser Thr Ile Leu Ser Glu Thr Pro Val Leu Arg
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Asn Gln Thr Ser Ser Tyr Arg Val Glu Lys Ser Lys Phe Glu Val Arg
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Ala Leu Ala Ser Arg Cys Leu Val Glu Gly Asp Gln Leu Asp Asp Met
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Leu Gln Pro Leu Asn Leu Glu Leu Ser Pro Glu Glu Glu Val Thr Val
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Leu Met His Met Asp Ile Ile Arg Glu Asn Gly Phe Leu Leu Glu Glu
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Asn Pro Ser Ala Pro Pro Gly Lys His Phe Arg Leu Arg Ala Ile Pro
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Tyr Ser Lys Asn Ile Thr Phe Gly Val Glu Asp Leu Lys Asp Leu Ile
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Ser Thr Leu Gly Asp Asn His Gly Glu Cys Ser Val Ala Ser Ser Tyr
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Lys Thr Ser Lys Thr Asp Ser Ile Cys Pro Ser Arg Val Arg Ala Met
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Leu Ala Ser Arg Ala Cys Arg Ser Ser Val Met Ile Gly Asp Pro Leu
705   710   715   720

Arg Lys Asn Glu Met Gln Lys Ile Val Glu His Leu Ala Asp Leu Glu
              725   730   735

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Ser Pro Trp Asn Cys Pro His Gly Arg Pro Thr Met Arg His Leu Val
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Val Val Ser Cys Ser Val Lys Val Val Asp Asp Gly Ser Gly Val Ser
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His Asp Phe Thr Asn Val Glu Thr Ala Ser Glu Thr Phe Gly Phe Arg
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Gly Glu Ala Leu Ala Ser Ile Ser Asp Ile Ser Leu Leu Glu Val Arg
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Thr Lys Ala Ile Gly Arg Pro Asn Gly Tyr Arg Lys Val Met Lys Gly
        115   120   125

Ser Lys Cys Leu His Leu Gly Ile Asp Asp Asp Arg Lys Asp Ser Gly
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Thr Thr Val Thr Val Arg Asp Leu Phe Tyr Ser Gln Pro Val Arg Arg
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Lys Tyr Met Gln Ser Ser Pro Lys Lys Val Leu Glu Ser Ile Lys Lys
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Cys Val Phe Arg Ile Ala Leu Val His Ser Asn Val Ser Phe Ser Val
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Phe Glu Cys Ala Asp Asp Trp Lys Pro Thr Asp Gly Gln Gln Thr Gly
            245             250             255

Arg Arg Asn Arg Leu Gln Ser Asn Pro Gly Tyr Ile Leu Cys Ile Ala
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Cys Pro Arg Arg Leu Tyr Glu Phe Ser Phe Glu Pro Ser Lys Thr His
        275             280             285

Val Glu Phe Lys Lys Trp Gly Pro Val Leu Ala Phe Ile Glu Arg Ile
    290             295             300

Thr Leu Ala Asn Trp Lys Lys Asp Arg Ile Leu Glu Leu Phe Asp Gly
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Gly Ala Asp Ile Leu Ala Lys Gly Asp Arg Gln Asp Leu Ile Asp Asp
            325             330             335

Lys Ile Arg Leu Gln Asn Gly Ser Leu Phe Ser Ile Leu His Phe Leu
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Asp Ala Asp Trp Pro Glu Ala Met Glu Pro Ala Lys Lys Lys Leu Lys
        355             360             365

Arg Ser Asn Asp His Ala Pro Cys Ser Ser Leu Leu Phe Pro Ser Ala
    370             375             380

Asp Phe Lys Gln Asp Gly Asp Tyr Phe Ser Pro Arg Lys Asp Val Trp
385             390             395             400

Ser Pro Glu Cys Glu Val Glu Leu Lys Ile Gln Asn Pro Lys Glu Gln
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Gly Thr Val Ala Gly Phe Glu Ser Arg Thr Asp Ser Leu Leu Gln Ser
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Arg Asp Ile Glu Met Gln Thr Asn Glu Asp Phe Pro Gln Val Thr Asp
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Met Lys Asp Ser Asp Val Leu Asn Phe Gln Phe Gln Gly Leu Lys Asp
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Glu Leu Asp Val Ser Asn Cys Ile Gly Lys His Leu Leu Arg Gly Cys
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Ser Ser Arg Val Ser Leu Thr Phe His Glu Pro Lys Leu Ser His Val
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Glu Gly Tyr Glu Ser Val Val Pro Met Ile Pro Asn Glu Lys Gln Ser
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Ser Pro Arg Val Leu Glu Thr Arg Glu Gly Gly Ser Tyr Cys Asp Val
545             550             555                 560

Tyr Ser Asp Lys Thr Pro Asp Cys Ser Leu Gly Ser Ser Trp Gln Asp
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Thr Asp Trp Phe Thr Pro Gln Cys Ser Ser Asp Arg Gly Cys Val Gly
            580             585             590

Ile Gly Glu Asp Phe Asn Ile Thr Pro Ile Asp Thr Ala Glu Phe Asp
        595             600             605

Ser Tyr Asp Glu Lys Val Gly Ser Lys Lys Tyr Leu Ser Ser Val Asn
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Val Gly Ser Ser Val Thr Gly Ser Phe Cys Leu Ser Ser Glu Trp Ser
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Pro Met Tyr Ser Thr Pro Ser Ala Thr Lys Trp Glu Ser Glu Tyr Gln
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Lys Gly Cys Arg Ile Leu Glu Gln Ser Leu Arg Leu Gly Arg Met Pro
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Asp Pro Glu Phe Cys Phe Ser Ala Ala Asn Asn Ile Lys Phe Asp His
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Glu Val Ile Pro Glu Met Asp Cys Cys Glu Thr Gly Thr Asp Ser Phe
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Ser Trp Gly His Ala Asp Asp Val Arg Ile Asp Gln Tyr Ser Ile Arg
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Lys Glu Lys Phe Ser Tyr Met Asp Gly Thr Gln Asn Asn Ala Gly Lys
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Gln Arg Ser Lys Arg Ser Arg Ser Ala Pro Pro Phe Tyr Arg Glu Lys
            755             760             765

Lys Arg Phe Ile Ser Leu Ser Cys Lys Ser Asp Thr Lys Pro Lys Asn
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Ser Asp Pro Ser Glu Pro Asp Asp Leu Glu Cys Leu Thr Gln Pro Cys
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Asn Ala Ser Gln Met His Leu Lys Cys Ser Ile Leu Asp Asp Val Ser
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Tyr Asp His Ile Gln Glu Thr Glu Lys Arg Leu Ser Ser Ala Ser Asp
            820             825             830

Leu Lys Ala Ser Ala Gly Cys Arg Thr Val His Ser Glu Thr Gln Asp
        835             840             845

Glu Asp Val His Glu Asp Phe Ser Ser Glu Glu Phe Leu Asp Pro Ile
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Lys Ser Thr Thr Lys Trp Arg His Asn Cys Ala Val Ser Gln Val Pro
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Lys Glu Ser His Glu Leu His Gly Gln Asp Gly Val Phe Asp Ile Ser
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Ser Gly Leu Leu His Leu Arg Ser Asp Glu Ser Leu Val Pro Glu Ser
        900             905             910

Ile Asn Arg His Ser Leu Glu Asp Ala Lys Val Leu Gln Gln Val Asp
        915             920             925

Lys Lys Tyr Ile Pro Ile Val Ala Cys Gly Thr Val Ala Ile Val Asp
    930             935             940

Gln His Ala Ala Asp Glu Arg Ile Arg Leu Glu Glu Leu Arg Thr Lys
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Asp Trp Gly Trp Ile Cys Asn Ile  Thr Val Glu Gly Ser  Thr Ser Phe
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Lys Lys Asn Met Ser Ile Ile Gln Arg Lys Pro Thr Pro Ile Thr
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Leu Asn Ala Val Pro Cys Ile Leu Gly Val Asn Leu Ser Asp Val
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Asp Leu Leu Glu Phe Leu Gln Gln Leu Ala Asp Thr Asp Gly Ser
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Ser Thr Ile Pro Pro Ser Val Leu Arg Val Leu Asn Ser Lys Ala
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Cys Arg Gly Ala Ile Met Phe Gly Asp Ser Leu Leu Pro Ser Glu
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Cys Ser Leu Ile Ile Asp Gly Leu Lys Gln Thr Ser Leu Cys Phe
    1085            1090            1095

Gln Cys Ala His Gly Arg Pro Thr Thr Val Pro Leu Val Asp Leu
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Lys Ala Leu His Lys Gln Ile Ala Lys Leu Ser Gly Arg Gln Val
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Glu Arg Ser Arg Glu Asp Val Val Pro Leu Asn Asp Ser Ser Leu Cys
        115             120             125


Met Lys Ala Asn Asp Val Ile Pro Gln Phe Arg Ser Asn Asn Gly Lys
    130             135             140


Thr Gln Glu Arg Asn His Ala Phe Ser Phe Ser Gly Arg Ala Glu Leu
145             150             155                     160


Arg Ser Val Glu Asp Ile Gly Val Asp Gly Asp Val Pro Gly Pro Glu
            165             170             175


Thr Pro Gly Met Arg Pro Arg Ala Ser Arg Leu Lys Arg Val Leu Glu
            180             185             190


Asp Glu Met Thr Phe Lys Glu Asp Lys Val Pro Val Leu Asp Ser Asn
        195             200             205


Lys Arg Leu Lys Met Leu Gln Asp Pro Val Cys Gly Glu Lys Lys Glu
    210             215             220


Val Asn Glu Gly Thr Lys Phe Glu Trp Leu Glu Ser Ser Arg Ile Arg
225             230             235                     240


Asp Ala Asn Arg Arg Arg Pro Asp Asp Pro Leu Tyr Asp Arg Lys Thr
            245             250             255


Leu His Ile Pro Pro Asp Val Phe Lys Lys Met Ser Ala Ser Gln Lys
            260             265             270


Gln Tyr Trp Ser Val Lys Ser Glu Tyr Met Asp Ile Val Leu Phe Phe
        275             280             285


Lys Val Gly Lys Phe Tyr Glu Leu Tyr Glu Leu Asp Ala Glu Leu Gly
    290             295             300


His Lys Glu Leu Asp Trp Lys Met Thr Met Ser Gly Val Gly Lys Cys
305             310             315                     320
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Arg Gln Val Gl.. Ile Ser Glu Ser Gly Ile Asp Glu Ala Val Gln Lys
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Leu Leu Ala Arg Gly Tyr Lys Val Gly Arg Ile Glu Gln Leu Glu Thr
                340   345   350

Ser Asp Gln Ala Lys Ala Arg Gly Ala Asn Thr Ile Ile Pro Arg Lys
            355   360   365

Leu Val Gln Val Leu Thr Pro Ser Thr Ala Ser Glu Gly Asn Ile Gly
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Pro Asp Ala Val His Leu Leu Ala Ile Lys Glu Ile Lys Met Glu Leu
385   390   395   400

Gln Lys Cys Ser Thr Val Tyr Gly Phe Ala Phe Val Asp Cys Ala Ala
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Leu Arg Phe Trp Val Gly Ser Ile Ser Asp Asp Ala Ser Cys Ala Ala
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Leu Gly Ala Leu Leu Met Gln Val Ser Pro Lys Glu Val Leu Tyr Asp
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Ser Lys Gly Leu Ser Arg Glu Ala Gln Lys Ala Leu Arg Lys Tyr Thr
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Gly Asp Thr Asp Ala Ala Gly Val Arg Asn Ile Ile Glu Ser Asn Gly
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Tyr Phe Lys Gly Ser Ser Glu Ser Trp Asn Cys Ala Val Asp Gly Leu
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Asn Glu Cys Asp Val Ala Leu Ser Ala Leu Gly Glu Leu Ile Asn His
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Leu Ser Arg Leu Lys Leu Glu Asp Val Leu Lys His Gly Asp Ile Phe
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Pro Tyr Gln Val Tyr Arg Gly Cys Leu Arg Ile Asp Gly Gln Thr Met
545   550   555   560

Val Asn Leu Glu Ile Phe Asn Asn Ser Cys Asp Gly Gly Pro Ser Gly
            565   570   575

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Thr Leu Tyr Lys Tyr Leu Asp Asn Cys Val Ser Pro Thr Gly Lys Arg
        580                     585                 590

Leu Leu Arg Asn Trp Ile Cys His Pro Leu Lys Asp Val Glu Ser Ile
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Asn Lys Arg Leu Asp Val Val Glu Glu Phe Thr Ala Asn Ser Glu Ser
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Met Gln Ile Thr Gly Gln Tyr Leu His Lys Leu Pro Asp Leu Glu Arg
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Leu Leu Gly Arg Ile Lys Ser Ser Val Arg Ser Ser Ala Ser Val Leu
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Pro Ala Leu Leu Gly Lys Lys Val Leu Lys Gln Arg Val Lys Ala Phe
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Gly Gln Ile Val Lys Gly Phe Arg Ser Gly Ile Asp Leu Leu Leu Ala
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Leu Gln Lys Glu Ser Asn Met Met Ser Leu Leu Tyr Lys Leu Cys Lys
    690             695                 700

Leu Pro Ile Leu Val Gly Lys Ser Gly Leu Glu Leu Phe Leu Ser Gln
705                 710             715                     720

Phe Glu Ala Ala Ile Asp Ser Asp Phe Pro Asn Tyr Gln Asn Gln Asp
            725             730                 735

Val Thr Asp Glu Asn Ala Glu Thr Leu Thr Ile Leu Ile Glu Leu Phe
        740             745                 750

Ile Glu Arg Ala Thr Gln Trp Ser Glu Val Ile His Thr Ile Ser Cys
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Leu Asp Val Leu Arg Ser Phe Ala Ile Ala Ala Ser Leu Ser Ala Gly
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Ser Met Ala Arg Pro Val Ile Phe Pro Glu Ser Glu Ala Thr Asp Gln
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Asn Gln Lys Thr Lys Gly Pro Ile Leu Lys Ile Gln Gly Leu Trp His
            805             810                 815

Pro Phe Ala Val Ala Ala Asp Gly Gln Leu Pro Val Pro Asn Asp Ile
            820             825                 830
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Leu Leu Gly Glu Ala Arg Arg Ser S   Gly Ser Ile His Pro Arg Ser
        835   840   845

Leu Leu Leu Thr Gly Pro Asn Met Gly Gly Lys Ser Thr Leu Leu Arg
        850   855   860

Ala Thr Cys Leu Ala Val Ile Phe Ala Gln Leu Gly Cys Tyr Val Pro
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Cys Glu Ser Cys Glu Ile Ser Leu Val Asp Thr Ile Phe Thr Arg Leu
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Gly Ala Ser Asp Arg Ile Met Thr Gly Glu Ser Thr Phe Leu Val Glu
                900   905   910

Cys Thr Glu Thr Ala Ser Val Leu Gln Asn Ala Thr Gln Asp Ser Leu
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Val Ile Leu Asp Glu Leu Gly Arg Gly Thr Ser Thr Phe Asp Gly Tyr
        930   935   940

Ala Ile Ala Tyr Ser Val Phe Arg His Leu Val Glu Lys Val Gln Cys
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Arg Met Leu Phe Ala Thr His Tyr His Pro Leu Thr Lys Glu Phe Ala
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Ser His Pro Arg Val Thr Ser Lys His Met Ala Cys Ala Phe Lys Ser
                980   985   990

Arg Ser Asp Tyr Gln Pro Arg Gly Cys Asp Gln Asp Leu Val Phe Leu
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Tyr Arg Leu Thr Glu Gly Ala Cys Pro Glu Ser Tyr Gly Leu Gln
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Val Ala Leu Met Ala Gly Ile Pro Asn Gln Val Val Glu Thr Ala
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Ser Gly Ala Ala Gln Ala Met Lys Arg Ser Ile Gly Glu Asn Phe
    1040   1045   1050

Lys Ser Ser Glu Leu Arg Ser Glu Phe Ser Ser Leu His Glu Asp
    1055   1060   1065

Trp Leu Lys Ser Leu Val Gly Ile Ser Arg Val Ala His Asn Asn
    1070   1075   1080

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His Glu Ile Lys Ser Ser Tyr Cys Val Pro Lys
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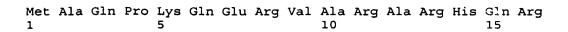Met Ala Gln Pro Lys Gln Glu Arg Val Ala Arg Ala Arg His Gln Arg
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Ser Glu Thr Ala Arg His Gln Arg Ser Glu Thr Ala Lys Thr Pro Thr
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Leu Gly Asn Arg Gln Thr Pro Thr Leu Gly Asn Arg Gln Thr Pro Arg
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Leu Gly Ile His Ala Arg Pro Arg Arg Arg Ala Thr Thr Ser Leu Leu
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Thr Leu Leu Leu Ala Phe Gly Lys Asn Ala Val Arg Cys Ala Leu Ile
65              70              75              80


Gly Pro Gly Ser Leu Thr Ser Arg Thr Arg Pro Leu Thr Glu Pro Leu
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Val Glu His Asn Val Glu Ser Ser Arg Trp Glu Pro Arg Arg Arg Gly
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Ala Cys Gly Ser Arg Gly Gly Asn Phe Pro Ser Pro Arg Gly Gly Ser
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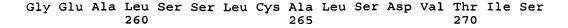Gly Pro Val Val Pro Ser Leu Arg Pro Asn Ala Val Lys Glu Leu Val
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Glu Asn Ser Leu Asp Ala Gly Ala Thr Asn Val Asp Leu Lys Leu Lys
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Asp Tyr Gly Val Asp Leu Ile Glu Val Ser Gly Asn Gly Cys Gly Val
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Glu Glu Glu Asn Phe Glu Gly Phe Thr Leu Lys His His Thr Cys Lys
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Ile Gln Glu Phe Ala Asp Leu Thr Gln Val Glu Thr Phe Gly Phe Arg
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Tyr Gly Lys Ile Ile Gln Lys Thr Pro Tyr Pro Arg Pro Arg Gly Met
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Thr Val Ser Val Lys Gln Leu Phe Ser Thr Leu Pro Val His His Lys
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Glu Phe Gln Arg Asn Ile Lys Lys Lys Arg Ala Cys Phe Pro Phe Ala
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Phe Cys Arg Asp Cys Gln Phe Pro Glu Ala Ser Pro Ala Met Leu Pro
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Val Gln Pro Val Glu Leu Thr Pro Arg Ser Thr Pro Pro His Pro Cys
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Pro Pro Arg Pro Leu Gly Ser Arg Gly Ala Glu Ala Ala Glu Pro Gln
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Glu Gly Leu Ser Ala Thr Val Ser Ala Cys Phe Gln Glu Gln Gln Glu
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Met Asn Thr Leu Gln Gly Pro Val Ser Phe Lys Asp Val Ala Val Asp
            100                 105                 110


Phe Thr Gln Glu Glu Trp Arg Gln Leu Asp Pro Asp Glu Lys Ile Ala
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Tyr Gly Asp Val Met Leu Glu Asn Tyr Ser His Leu Val Ser Val Gly
    130                 135                 140


Tyr Asp Tyr His Gln Ala Lys His His His Gly Val Glu Val Lys Glu
145                 150                 155                 160


Val Glu Gln Gly Glu Glu Pro Trp Ile Met Glu Gly Glu Phe Pro Cys
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Gln His Ser Pro Glu Pro Ala Lys Ala Ile Lys Pro Ile Asp Arg Lys
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Ser Val His Gln Ile Cys Ser Gly Pro Val Val Leu Ser Leu Ser Thr
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Ala Val Lys Glu Leu Val Glu Asn Ser Leu Asp Ala Gly Ala Thr Asn
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Ile Asp Leu Lys Leu Lys Asp Tyr Gly Val Asp Leu Ile Glu Val Ser
225                 230             235                 240

Asp Asn Gly Cys Gly Val Glu Glu Glu Asn Phe Glu Gly Leu Ile Ser
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Phe Ser Ser Glu Thr Ser His Met
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